Key risk factors may reveal gram-negative pneumonia

by William E. Haik, MD

Editor’s note: In the April CDI Journal, Haik examined aspiration pneumonia.
In this month’s follow-up article, he discusses the clinical signs and symptoms of gram-negative pneumonia.

Just as with aspiration pneumonia, big questions face CDI specialists when dealing with gram-negative pneumonia. Such questions include: When should a CDI specialist suspect gram-negative pneumonia (ICD-9-CM code 482.83) in a medical record in which the physician has merely documented pneumonia? And what clinical evidence should CDI specialists look for in the medical record that may be clues that a patient’s pneumonia is truly gram-negative?

Disease background
Frequently, patients are admitted to a hospital when a physician suspects the presence of a gram-negative rod organism is causing the pneumonia.

Although patients with this diagnosis receive highly resource-intensive treatment, physicians often fail to document the sputum cultures appropriately, neglecting to document the specific organism and showing only normal flora or no growth.

Moreover, the culture of expectorated sputum is of limited value in the diagnosis of acute pneumonia when the patient has previously received antibiotics, is unable to expectorate a sputum sample from the lower airways, or when the organism is highly fastidious.

For these reasons, physicians commonly rely on clinical criteria to help them determine the appropriate treatment of a patient when sputum cultures are not reliable.

Determining susceptibility

Certain patients are more susceptible to gram-negative bacterial pneumonias, including:

» Those who are in a setting where they can be colonized with a gram-negative bacteria. Nursing homes and hospitals are a common breeding ground for gram-negative pneumonia. In those settings, patients are frequently exposed to the gram-negative pneumonia, which travels to the back of the patient’s pharynx and remains there. At this stage, the pneumonia is harmless to the patient.

» Those who have a preexisting susceptibility to gram-negative pneumonia. To have gram-negative pneumonia, colonization is not enough; the bacteria must invade a patient. Invasion occurs when a patient does not have the proper immunity to fight the bacteria. Patients with multiple immune diseases, such as diabetes, congestive heart failure,
or chronic renal failure, are often susceptible, as well as those with structural diseases, such as chronic obstructive pulmonary disease.

Once a gram-negative bacterium settles on the back of susceptible patients’ throats, they don’t have the defense mechanisms to fight it.

The gram-negative bacterium then travels into the lungs, and the patient becomes infected.

Instead of reporting simple pneumonia, it may be appropriate for a CDI specialist to query for gram-negative pneumonia when a physician documents pneumonia in the chart of a patient that:

» Is in a setting that is known to commonly breed this form of bacteria
» Has preexisting susceptibility
» Is receiving treatment, including antibiotic therapy

For additional clinical criteria and treatment consistent with gram-negative bacterial pneumonia (excluding *H. influenzae*), see “Gram negative pneumonia in the absence of confirmatory cultures” below.

**Editor’s note:** Haik is the director of DRG Review, Inc., in Fort Walton Beach, FL, where he has practiced medicine since 1980. He has received board certification in internal, pulmonary, and critical care medicine.

Haik served on the editorial advisory board of AHA Coding Clinic for ICD-9-CM from 1988–1992 and subsequently on the expert advisory panel. Presently, he serves on the Hospital Payment Monitoring Program of the Florida Quality Improvement Organization. You can reach him via e-mail at DRGreview@aol.com.

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**Gram-negative pneumonia in the absence of confirmatory cultures**

Clinical criteria consistent with gram-negative bacterial pneumonia (ICD-9-CM code 482.83, excluding *H. influenzae*) include the following:

» **High-risk host with a serious underlying disease, which results in failure to combat gram-negative bacterial pneumonia:**
  - Chronic obstructive pulmonary disease (e.g., bronchiectasis and emphysema)
  - Diabetes mellitus
  - Immunosuppression (e.g., malignancy, prednisone therapy and chemotherapy)
  - Chronic malnutrition
  - Advanced age
  - Chronic alcoholism
  - Chronic renal disease
  - Chronic liver disease
  - Congestive heart failure

» **Sputum gram stain showing predominance of gram-negative bacterial rods:**
  - Invalid sputum culture due to outpatient antibiotic therapy, and the inability to produce an adequate sputum sample

» **High-risk setting for colonization with gram-negative bacteria:**
  - Hospitalization within one year
  - Nursing home patient
  - Recent antibiotic use

» **Appropriate antibiotic therapy for gram-negative bacterial pneumonia:**
  - Third/fourth-generation cephalosporin, including Fortaz, Claforan, Cefobid, Rocephin, and Maxipime
  - Aminoglycosides, including Tobramycin, Gentamycin, and Amikacin
  - Extended Spectrum Penicillins, including Timentin, Unasyn, Ticarcillin, and Piperacillin
  - Quinolones, including Cipro, Lévaquin, and Tequin
  - Other, including Primaxin, and Azactam

» **Prolonged length of hospital stay with increased hospital resources used**